

YM1300D Power Steering upgrade

By Alex Buchanan

06/24/2014

After welding the steering box teeth up 3 different times on this little YM1300D, I decided to go for broke and rather than try and make one of the Hoyes style power steering assist setup, just eliminate it all together and go full hydraulic steering (the kind you see on 4x4 rock crawlers or a lot of forklifts).

I started out measuring the actual amount of movement the stock tie rods have when turning the steering wheel. The distance was between 4.5-5". At 5" of travel the bar started making contact with the front tire.

Next up, removed all of the steering components down to the steering arm on the front axle. I've obtained a steering control unit off a forklift (orbitrol valve) and started mocking it up.

My intention is to use a hydraulic cylinder and what would be the best one to use. With available parts, I figured originally to go with a 4" stroke cylinder and lose a little bit of turning radius. Stopping by my local hydraulic shop/cylinder shop (whom I've made good friends with since starting this) and the guy suggested a 6" stroke and to put an internal stop inside the cylinder and an external stop, this way one can fine tune the needed stroke. So I purchased a 2" bore 6" stroke hydraulic cylinder and set to work mocking it up.







My original thought was to place the cylinder on the floor board of the tractor (where you would rest your left foot), after all even if you put your foot on the cylinder it wouldn't be moving and you really wouldn't hurt it. I planned on using the stock tie rod but after running the cylinder out and then moving the stock rod out to match, it was apparent it was not going to work. So I relocated the mounting point of the cylinder.



This was going to be the mounting point but then proved to be too close to the steering arm.





The final mounting point has under gone a few revisions and will be talked about a bit later here. So then I found a little Toyota Corolla tie-rod off of a rack and pinion matching the taper and size pretty well. So with my autoparts knowledge I set off to Napa to look at there suspension book and find another tie-rod that had the same taper/dimensions but a female thread instead. I finally found it off of a Cadillac Catera (iirc) this looked like it was going to work perfect as it had some length to it and was bent similar to the original rod.





However after trying to run it in and out a few times it was evident it was going to jam. Also it was too long to relocate the mounting point off the floor board of the tractor.

So after realizing it was too long to relocate and retain a ball joint that ended up binding anyway, I decided to opt out of a tie rod setup all together and ran the cylinder clevis pin through the hole of the tie rod.





This actually gave a short enough distance to mount the cylinder off the floor board but still retain a long enough stroke to fully turn left and right.

So here is the mocked up mounting point hooked up, I used compressed air to operate the cylinder in and out. I don't have one picture, I originally had the cylinder clevis pin running thru the mounting point you can see in the picture, without the black mount with the second pin. But the cylinder would bind at about $\frac{3}{4}$ of its movement (due to the cylinder only moving in one plane), I had to come up with a way for the cylinder to go both left and right, and up and down (to make an arc), I found this black piece at the local tractor supply store (it is for 3 point attachments and stuff, as I am sure most of you are aware). Once this was in, it was just a matter of fine tuning the length to get maximum extension/retraction.



The final cut down length.



Now the hydraulic cylinder was moving the steering full left and right turns.

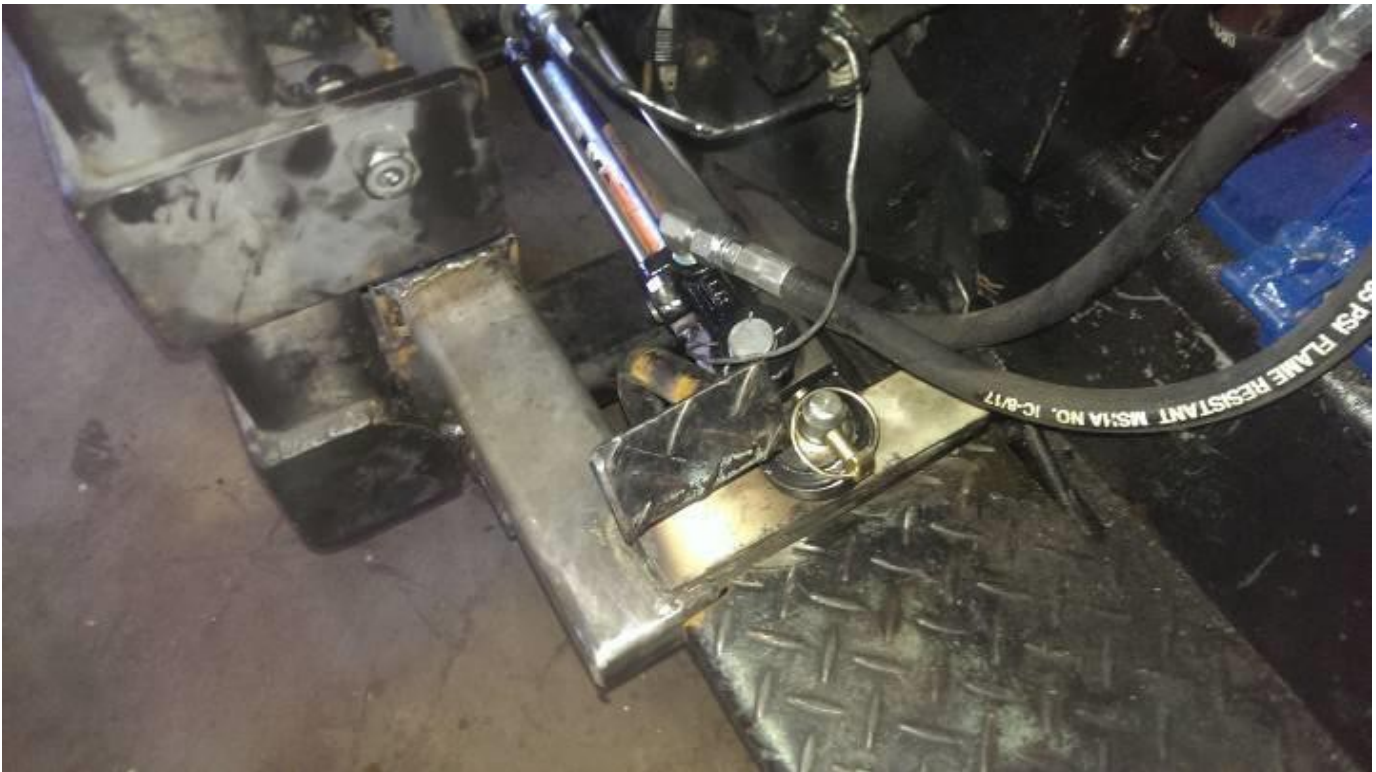
Now on to the steering control unit setup. I started with the stock base plate and proceeded to build freestyle.





After running the cylinder with weight on the tractor around my yard I noticed the angle bracket I built was flexing a little too much to my liking, so I welded a ½" thick plate to the top of the angle bracket and added the 2x3" square tubing to the brace of the FEL. I drilled and tapped the bracket I welded to the brace so it can all be unbolted as needed should the FEL ever need to come off. The mount for the FEL will still be on the tractor so the steering will always be there. Should the FEL mount be removed you will not have hydraulic steering anymore. However this would indicate the tractor being separated for major engine/trans work.





These final pictures are of the finished product. Only a few things left to do; getting a smaller supply hose to the FEL valves as it is too long and does not sit under the “dashboard” very easily and modify the dashboard mount so the dashboard sits more level.